09673-185

PATENT COOPERATION TREATY

PCT

REC'D 24 APR 2001
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

TC 3700 AUG 1 2001 RECEIVED

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PE-3795		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/BR00/00022	17/03/2000	17/03/1999

International Patent Classification (IPC) or national classification and IPC
A61F13/20

Applicant
JOHNSON & JOHNSON INDUSTRIA E COMERCIO LTDA.

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
17/10/2000	20.04.2001

Name and mailing address of the international preliminary examining authority:
European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer
Louter, P
Telephone No. +49 89 2399 2063

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/BR00/00022

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-7 as originally filed

Claims, No.:

1-22 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	5-8,18,19
	No:	Claims	1-4,9-17,20-22
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-22
Industrial applicability (IA)	Yes:	Claims	1-22
	No:	Claims	

2. Citations and explanations
   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Reference is made to the following documents:

D1: DE-A-2 423 790
D2: WO-A-99 33428

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The present application does not meet the requirements of Article 33(2) PCT, because the subject-matter of claims 1-4, 9, 10-17 and 20-22 is not new in respect of the prior art as defined in the regulations (Rule 64(1)-(3) PCT) for the following reasons:

1.1 The length of the removal cord according to D1 is reduced to 20% of its length (see page 5, lines 1-4). In use the cord is extensible to its original length (see page 5, lines 18-24). The removal cord thus has a extensibility of 400%. The cord of D1 further comprises synthetic fibers (see page 5, lines 25-28). The tampon according to claim 1 is therefore known from D1.

1.2 The crimping of the fibres in D1 results in a texturing. The tampon of claim 10 is therefore also known from D1.

Attention is drawn to the fact that the tampon of claim 10 is also known from D2 (see claim 3).

1.3 The removal cord of D1 further has a two phase tensile stress curve (see page 5, lines 18-24) as defined in claim 14. The tampon of claim 14 is therefore also known from D1.

The tampon according to claim 14 is also known from D2 for the reasons set out in point 1.2 of Item VIII below.

1.4 The additional features of claims 2-4, 9, 11-17 and 20-22 are also known from D1 or D2:

claims 2 and 3: see above point 1.1;
claim 4: see above point 1.2;
claims 11,12, 18, 19: see D2, abstract;
claim 9 and 13: see D1, page 5, lines 25-28;
claims 15, 16 17 and 20: see D1, page 5, lines 18-24;
claims 21 and 22: it is a property of all yarns to have a phase of plastic deformation.

2. The present application does not satisfy the criterion set forth in Article 33(3) PCT because the subject-matter of Claims 5 to 8, 18 and 19 does not involve an inventive step (Rule 65(1)(2) PCT) for the following reason:

   The additional features of these claims concern only slight constructional changes which come within the scope of the customary practice followed by persons skilled in the art.

Re Item VII

Certain defects in the international application

1. The requirements of Rule 6.3(b) PCT are not met because the independent claims are not properly cast in the two part form, with those features which in combination are part of the prior art (D1) being placed in the preamble.

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

3. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

Re Item VIII

Certain observations on the international application

1. The requirements of Article 6 PCT are not met for the following reason:

1.1 Although claims 1, 10 and 14 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought. The aforementioned claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

Hence, claims 1, 10 and 14 do not meet the requirements of Article 6 PCT.

1.2 It is a property of every material that the tensile stress curve is only linear within a certain range. Outside this range, it is always possible to distinguish (at least) two phases with an inflection point in between. The feature of the removal cord according to claim 14 concerning the stress curve is therefore non-limiting. It is therefore not clear what the intended scope of claim 14 is.

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
PE-3795		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/BR 00/ 00022	17/03/2000	17/03/2000

Applicant

JOHNSON & JOHNSON INDUSTRIA E COMERCIO LTDA.

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Line 1-11 delete, insert :
"Tampons (1) usually comprise a cord (5), which projects from one of the ends of the tampon (1) and is intended to enable one to remove said tampon (1) from the vaginal cavity right after its use."

INTERNATIONAL SEARCH REPORT

International Application No
PCT/BR 00/00022

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61F13/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 24 23 790 A (SCHICKEDANZ VER PAPIERWERK) 20 November 1975 (1975-11-20) page 3, line 8 -page 6, line 4 page 7, line 14 -page 8, line 23; figures 1-4	1-4,9, 10, 13-17, 20-22
X	WO 99 33428 A (PLAYTEX PRODUCTS INC) 8 July 1999 (1999-07-08) abstract; claims 1-7	10-12, 14-16, 18-22

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 September 2000	02/10/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Louter, P

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/BR 00/00022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 2423790 A	20-11-1975	NONE	
WO 9933428 A	08-07-1999	AU 1948699 A	19-07-1999

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International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 :
A61F 13/20

A2

(11) International Publication Number: WO 00/54714

(43) International Publication Date: 21 September 2000 (21.09.00)

(21) International Application Number: PCT/BR00/00022

(22) International Filing Date: 17 March 2000 (17.03.00)

(30) Priority Data:
PI 9901167-0 17 March 1999 (17.03.99) BR

(71) Applicant *(for all designated States except US)*: JOHNSON & JOHNSON INDÚSTRIA E COMÉRCIO LTDA. [BR/BR]; Rua Gerivatiba, 207, CEP-05501-030 São Paulo, SP (BR).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: PASSOS PROGLHOF, Igor, Philip [BR/BR]; Rua Euclides Miragaia, 565, ap. 13, São José dos Campos, SP (BR).

(74) Agent: DANNEMANN, SIEMSEN, BIGLER & IPANEMA MOREIRA; Caixa Postal 2142, Rua Marquês de Olinda, 70, CEP-22251-040 Rio de Janeiro, RJ (BR).

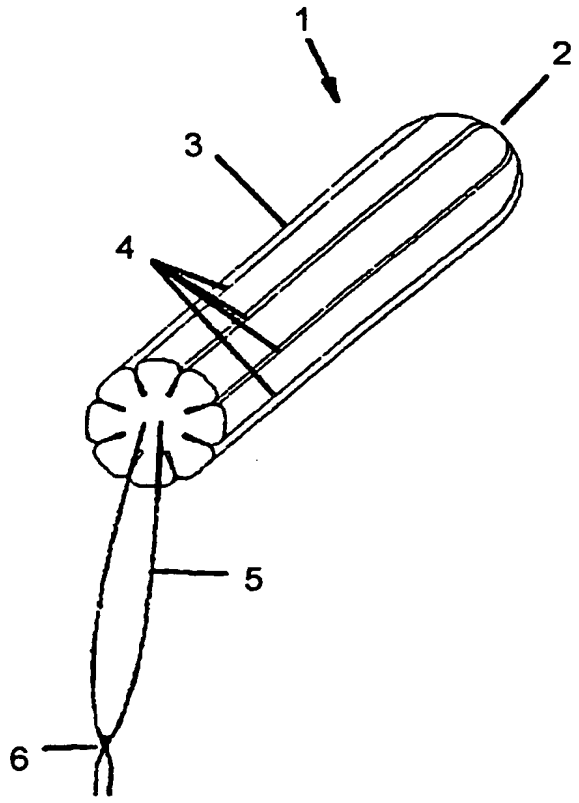
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: TAMPON

(57) Abstract

The present invention refers to an internal hygienic absorbent, also known as a tampon (1), particularly used for absorbing and holding vaginal exudates, such as menstrual blood and intermenstrual secretions. Tampons (1) are know from the prior art and usually comprise substantially cylindrical body made of an absorbent material (3), suitable for being introduced into the vaginal cavity. A cord (5) is also provided, which projects from one of the ends of the tampon (1) and is intended to enable one to remove said tampon (1) from the vaginal cavity right after its use. During the method of manufacturing the tampon (1), the absorbent body (3) is subjected to a compaction, and the cord (5) might be broken when an inextensible material is used to make it. One of the objectives of the present invention is to provide a cord (5) for a tampon (1) that will no be broken or damaged at the time of compacting the absorbent body (3), replacing the cord (5) that has been used at present. This objective is achieved by means of a tampon (1), particularly a tampon for holding vaginal exudates, comprising a substantially cylindrical absorbent body (3) having longitudinal grooves (4) in its surface and comprising a cord (5) suitable for handling said tampon (1), associated to the absorbent body (3), the cord (5) being textured. A method is also described for manufacturing said tampon (1) with the respective textured cord (5).



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Title: "TAMPON"

The present invention refers to an internal absorbent, also known as a tampon, being particularly used for absorbing and holding vaginal exudes, such as menstrual blood and intermenstrual secretions.

Description of the prior art

Tampons, in general, are known from the prior art and usually comprise a body made of an absorbent material having a substantially cylindrical shape, suitable for introduction into the vaginal cavity. According to some references in the state of the art, a tampon may be cylindrical and curved, and the context of the present invention should be understood in this sense.

Usually, such tampons are provided with a cord projecting from one of its ends, which is intended to facilitate the removal of the tampon out of the vaginal cavity after its use.

As a rule, the absorbent body of tampons are made of absorbent fibers such as cotton fibers, and may include a superabsorbent material, in order to increase the efficiency of holding liquids in said absorbent body.

The absorbent body is manufactured from a substantially rectangular web of absorbent fibers, first transversely folded and then rolled up so as to form a cylindrical piece, still with the same consistency of the absorbent fibers.

The tampons from the prior art may also comprise a film of non-woven fabric superposed on one of the surfaces of the web of absorbent fibers, in order to involve the absorbent material and impart greater consistency to it. when said web is rolled up.

Before rolling up the absorbent web, the cord is interwoven at the fold of the web and remains interwoven with the web while the latter is being rolled up, thus remaining permanently fixed to the absorbent body.

Then, the absorbent body undergoes a radial compaction process, whereby the tampon is formed.

The compaction, described in patent documents such as US 3,422,496 and EP 422,660, is carried out by a press provided with multiple blades (also called "jaw"), which are radially arranged and apply force to the absorbent body containing the cord, thus compacting said body, providing longitudinal grooves in this body and forming the tampon.

The material presently used in manufacturing the cord, typically cotton, has low elasticity and may be cut during the process of compacting the absorbent body with said blades.

That is to say, the cord may be damaged when the compaction of the absorbent material occurs in conjunction with said cord, and the force applied by the blades to said absorbent material is transferred to the cord, which might break or weaken the filaments of this cord, resulting in a failure of the product.

In spite of the very low probability of this problem occurring, the great drawback is that this damage or cut is not detected before the need for using the cord, that is, at the time of removing the tampon from the vaginal cavity.

Objective of the Invention

One of the objectives of the present invention is to provide a tampon with an elastic or extensible cord that will not be broken or damaged at the time of compacting the absorbent body, replacing the cotton cord, which has been used lately. This objective is achieved by means of a tampon, particularly a tampon for holding vaginal exudates, which comprises a substantially cylindrical absorbent body, preferably provided with longitudinal grooves in its surface and comprising a cord associated to the absorbent body, suitable for handling said tampon, the cord comprising synthetic fibers, preferably textured (crimped).

As used herein, an "elastic cord" is one provided with a higher or lower degree of property of quickly tending to return to its original dimensions, after removal of the force that is causing its elastic deformation. An "extensible cord" is one provided with the property

of extending or elongating without substantially permanent plastic deformation under application of a specific force. The cord of the invention may be either elastic or extensible without being elastic.

A further objective of the present invention is to provide a method of manufacturing a tampon using an extensible or elastic cord that will replace the cotton cord used at present. This objective is achieved by means of a method of manufacturing a tampon, particularly a tampon for holding vaginal exudates, comprising a substantially cylindrical absorbent body provided with longitudinal grooves in its surface and comprising a cord suitable for handling said tampon, associated with the absorbent body, the method comprising the steps of cutting a substantially rectangular portion of a web of an absorbent material, folding the absorbent web, interweaving the cord at the folded end of the web, rolling up the web to form the absorbent body, compacting the absorbent body by means of blades of a press, the cord being textured. Preferably, the process of the present invention involves a step of superposing a non-woven material on a surface of the web of absorbent material, after the step of cutting a substantially rectangular portion of said web of absorbent material.

The tampon cord of the present invention preferably comprises textured synthetic fibers. The textured fibers and/or the cord when tested for tensile strength and elongation properties, such as by the standardised test methods ASTM D-2256 and D-3822, exhibit a multi-phase, tensile stress-strain curve having an inflection point between a first and second phase. A typical stress-strain curve is a plot of the amount of stress applied to the material versus the amount of strain the material is undergoing. "Stress" is defined as force per unit original area, while "strain" is the amount of elongation over the original length. The slope of the stress-strain curve in the linear region of the plot is a measure of the material's elasticity. The slope measurement is referred to as "Young's modulus".

During the first phase, the fibers are extended, or "straightened out". That is, texture is removed from the fibers. There is considerable strain or elongation under a relatively low amount of stress, thus providing a first Young's modulus value. The second phase begins after the fibers are totally extended. In the second phase, a much greater amount of force is required to elongate the fibers. The material in the second phase will undergo a limited amount of elongation without permanent (plastic) deformation. Once the yield point, or point wherein deformation transitions from elastic deformation to plastic deformation, is reached, the elongation will be permanent and will alter the cross-sectional area of the ma-

terial. The second phase provides a second Young's modulus, which is greater than the first Young's modulus.

Synthetic fibers of similar chemical make-up in the absence of any texture will typically exhibit only a single-phase stress-strain curve that substantially corresponds to the second phase, as described above. Thus, one effect of the texture is to allow the material to be extended a much greater extent prior to undergoing plastic deformation, to a point of material failure.

Preferably, the material used in manufacturing the cord is polypropylene, polyester or nylon fibers or mixtures thereof, these fibers being subjected to a texturing process.

The texturing process is a physical-chemical treatment applied to threads of synthetic continuous fibers. This treatment aims at modifying the aspect, characteristics and properties of the fibers, usually causing them to be more elastic or extensible, due, partly or totally, to the fixation of folds or curves along the length of the fibers, for instance by means of heat. In other words, the linearity of the fibers is altered in a substantially permanent way.

Those skilled in the art know how to chose the process for obtaining texturing of fibers. Among the texturing processes known from the prior art, generically described in the literature of textile technology, the following can be pointed out: the continuous process, the false twist process, the modified false twist process, the process with a press-down chamber, the "spunize" process, the process with metallic blade, the "crinkle" process, the stuffer box process, the sterical buckling process and the air-blow process.

The fibers used to make the cord of the invention may be manufactured by any of the above processes, the air-blow process being the preferred one, which consists in interweaving the fibers at a high speed under application of hot or cold air to the fibers, the latter having been previously wetted with hot water.

The cord of the invention is composed of a set of fibers, preferably a set of cables of twisted fibers which, in turn, are joined together to compose the cord. Preferably, the number of fibers per cable ranges between about 30 and about 200. Preferably, the number of cables to form the cord ranges between about 8 and about 25, more preferably, about 12; preferably, the number of twist of the cables ranges between about 50 and about 250, more preferably, about 120; preferably the cables have dtex ranging between about 100 and about 200 (dtex being the weight in grams of 10,000 meters of cable).

The cord of the invention exhibits an elastic or non-elastic extensibility (calculated as the difference between the final length and the initial length divided by 100) higher than about 25%, preferably between about 30% and about 200, and more preferably between about 40% and about 60%.

In a preferred embodiment of the present invention, the cord is provided with a partly or totally fluid-repelling characteristic, for instance, by dipping it into a bath of a hydrophobic or fluid-repelling substance. This characteristic aims at preventing the blood absorbed by the tampon from contacting the cord, which would convey to the wearer a feeling of moisture and a little attractive visual aspect. It may also be dyed to a desired color.

Description of the Drawings

The present invention will now be described in greater detail with reference to an embodiment represented in the drawings. The accompanying figures have been made purposely without exact measures or proportions, because they are given by way of example.

Figure 1 is a perspective view of the tampon and cord according to the present invention.

Figure 2 is a view of a step of manufacturing the tampon after one folding of the web.

Figure 3 is a view of another step of manufacturing the tampon illustrated in figure 1, prior to the process of pressing the web, after rolling it up.

Figure 4 is a simplified representation of the press used for compacting the absorbent body when the compacting blades are open.

Figure 5 is a simplified representation of the press used for compacting the absorbent body when the compacting blades are closed.

Figure 6 is a view of the web of the tampon shown in figure 1, open after pressing; and

Figure 7 is a graph of the behavior of materials subjected to deformation.

Detailed Description of the Figures

As can be seen from figure 1, the tampon 1 comprises a substantially cylindrical absorbent body 3 having longitudinal grooves 4 in its surfaces and comprising a cord 5. The end 2 is substantially rounded or ogival in shape.

As known from the prior art, the absorbent body 3 is manufactured from a web of an absorbent material, for instance, cotton fibers mixed with rayon fibers cut with dimensions of approximately of 235 mm long and 50 mm broad, forming an absorbent web 10.

A film of non-woven material 11 is superposed on one of the surfaces of the web 10, as can be seen from figures 2 and 3. The film 11 is longer than the length of the absorbent body 3.

During the process of manufacturing the web 10, the latter is asymmetrically folded over itself, as shown in figure 2. The cord 5 is interwoven in the fold D of the web 10, and the ends of this cord are fixed with a knot 6.

Then, the web 10 is rolled up to form an absorbent body 3, as illustrated in figure 3. The part of the film 11 longer than the length of the absorbent body 3 is used to overlap the outer surface of the body 3, maintaining the web 10 rolled-up.

The absorbent body 3 is then passed through a press 40 and is compressed in order to mold the material into a cylindrical-ogival shape. Preferably, the end 2 of the tampon 1 is molded as an ogive, so that the tampon will have a rounded end, which facilitates its introduction into the vaginal cavity. The cord 5 projects from the opposite end of the tampon 1, as shown in figure 1.

The absorbent body 3 in conjunction with the cord 5 is then subjected to compaction.

As illustrated in figures 4 and 5, the press 40 is provided with a plurality of blades 41, which are moved radially towards the center of the press 40 (see figure 5), thus compressing the surface of the absorbent body 3, which remains with grooves 4 arranged longitudinally at the place where said blades 41 contact said absorbent body 3.

Thus, the cord 5 used at present might be damaged or even broken, in which case the tampon would be defective. As shown in figure 6, which illustrates a tampon 1, which has been unfolded after the pressing step, the cord 5 is capable of receiving higher

pressures, extending at the points 20, that is to say, in the regions where the blades 41 of the press 40 penetrate more deeply.

Thus, according to a preferred embodiment of the present invention, the cord 5 used at present is manufactured with a textured fiber that bears, without breaking, forces (stress) applied to the absorbent body 3 by said blades 41 of the press 40.

The use of a textured fiber in manufacturing the cord 5 prevents the latter from breaking during the process of pressing the absorbent body 3, since such a material enables the cord 5 to elongate and get molded according to the deformation caused on said body 3 by the blades 41 of the press 40.

A stress-strain curve of a cord of the present invention is illustrated in Figure 7. An introductory phase, a first phase, and second phase are separated in the vicinity of points P1 and P2, respectively. The first phase yields considerable elongation with limited amount of applied stress, thus exhibiting a relatively small first Young's modulus E1. The second phase has a much steeper linear range, providing a second Young's modulus E2 that is greater than E1. The first phase predominantly alters the material by removing texture therefrom. Therefore, material not having such texture would exhibit only a single-phase stress-strain curve similar to that shown in curve "1" having a Young's modulus corresponding substantially to E2. This cord would have a lesser amount of elongation prior to material failure.

A preferred embodiment of the invention having been described, one should understand that the scope of the present invention embraces all possible variations and is only limited by the contents of the claims, including the possible equivalents.

CLAIMS

1. A tampon having a removal cord comprising synthetic fibers, wherein the removal cord has an extensibility of greater than about 25 percent.

2. The tampon of claim 1 wherein the cord extensibility is from about 30 to about 200 percent.

3. The tampon of claim 2 wherein the cord extensibility is from about 40 to about 6200 percent.

4. The tampon of claim 1 wherein the synthetic fibers are textured.

5. The tampon of claim 4 wherein the texture is helical.

6. The tampon of claim 4 wherein the texture is zigzag.

7. The tampon of claim 1 wherein the removal cord comprises from about 8 to about 25 cables.

8. The tampon of claim 7 wherein each cable comprises from about 30 to about 200 fibers.

9. The tampon of claim 1 wherein the synthetic fibers are nylon.

10. A tampon having a removal cord comprising textured synthetic fibers.

11. The tampon of claim 10 wherein the texture is helical.

12. The tampon of claim 10 wherein the texture is zigzag.

13. The tampon of claim 10 wherein the synthetic fibers are nylon.

14. A tampon having a removal cord comprising synthetic fibers, wherein the removal cord has a two-phase, tensile stress-strain curve having an inflection point between a first and second phase.

15. The tampon of claim 14 wherein the first phase has a first Young's modulus and the second phase has a second Young's modulus.

16. The tampon of claim 15 wherein the second Young's modulus is greater than the first Young's modulus.

17. The tampon of claim 14 wherein the synthetic fibers are textured and stress in the first phase extends the synthetic fibers sufficiently to remove the texture.

18. The tampon of claim 17 wherein the texture is helical.

19. The tampon of claim 17 wherein the texture is zigzag.

20. The tampon of claim 14 wherein deformation of the synthetic fibers in the first phase is limited to elastic deformation.

21. The tampon of claim 14 wherein stress in the second phase is sufficient to impart plastic deformation of the synthetic fibers.

22. The tampon of claim 14 wherein the synthetic fibers undergo plastic deformation in the second phase.

FIG. 1

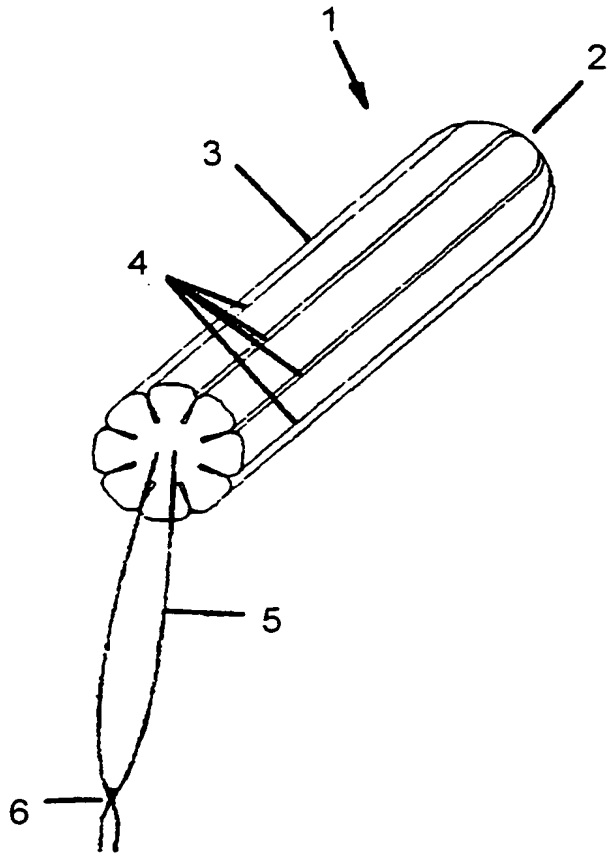


FIG. 2

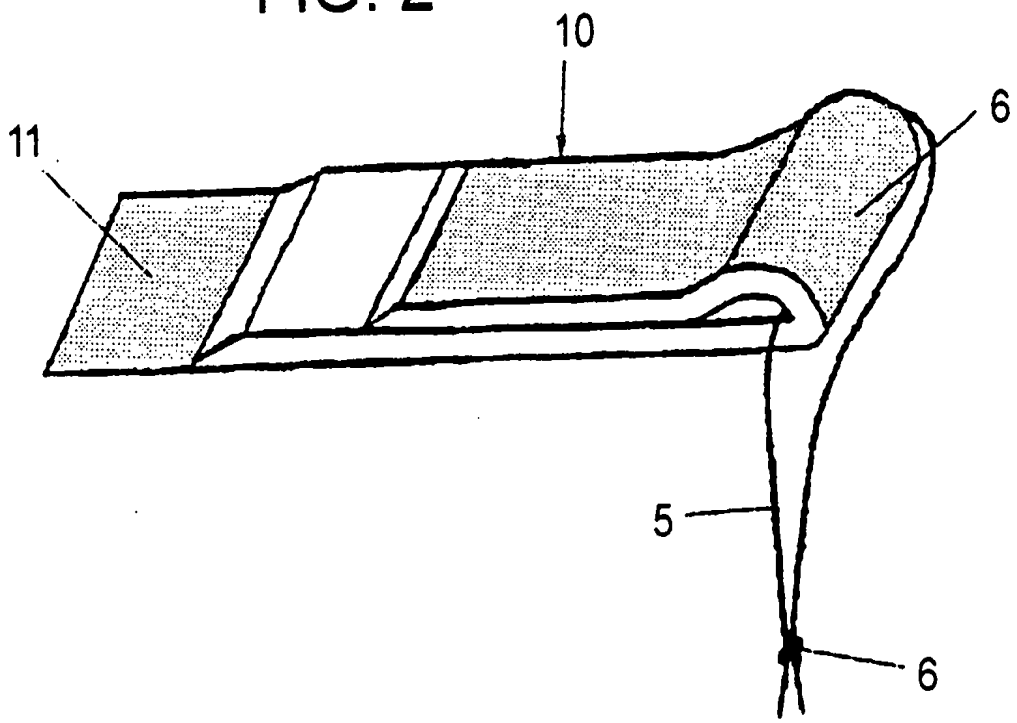
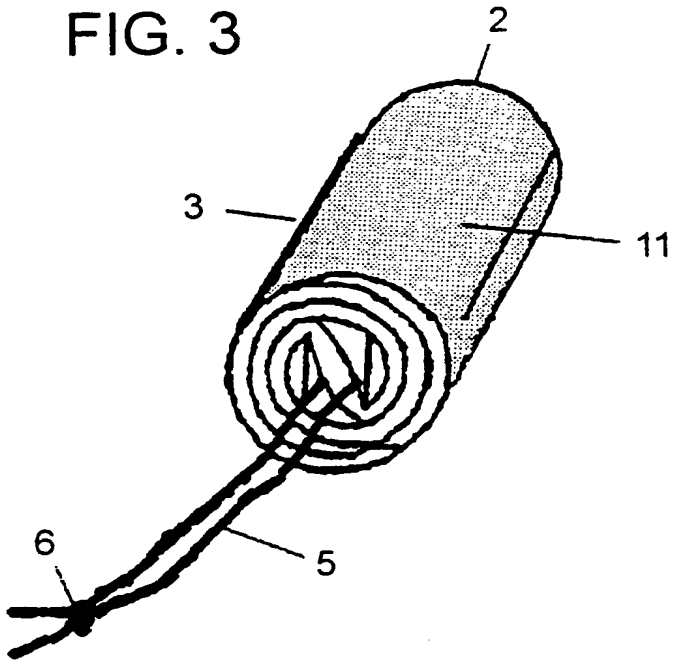


FIG. 3



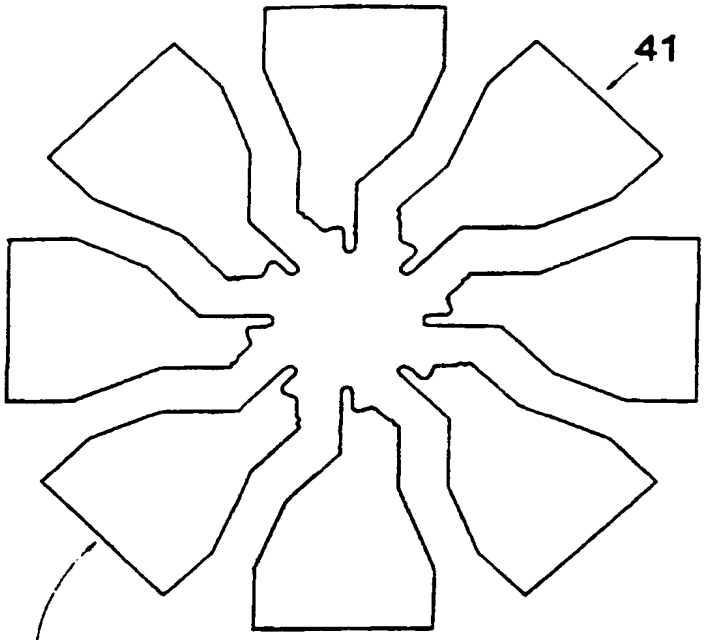


FIG. 4

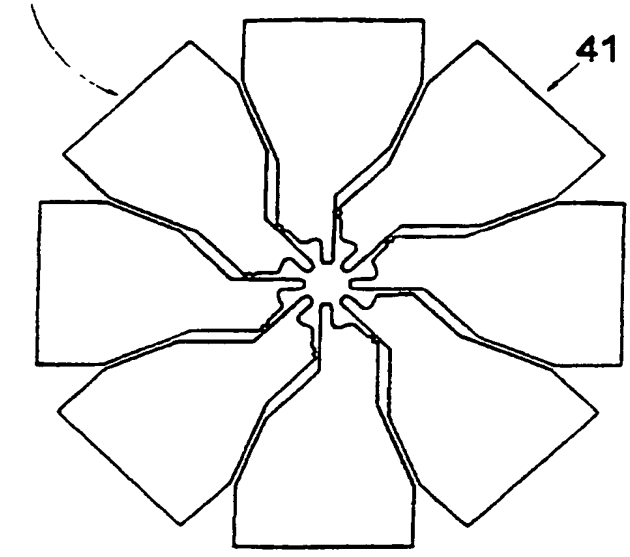


FIG. 5

FIG. 6

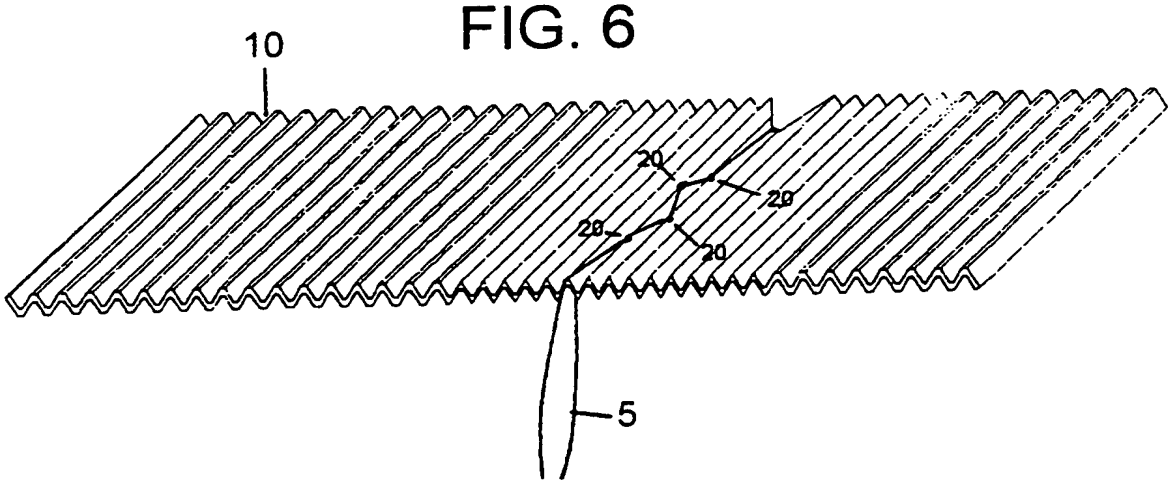
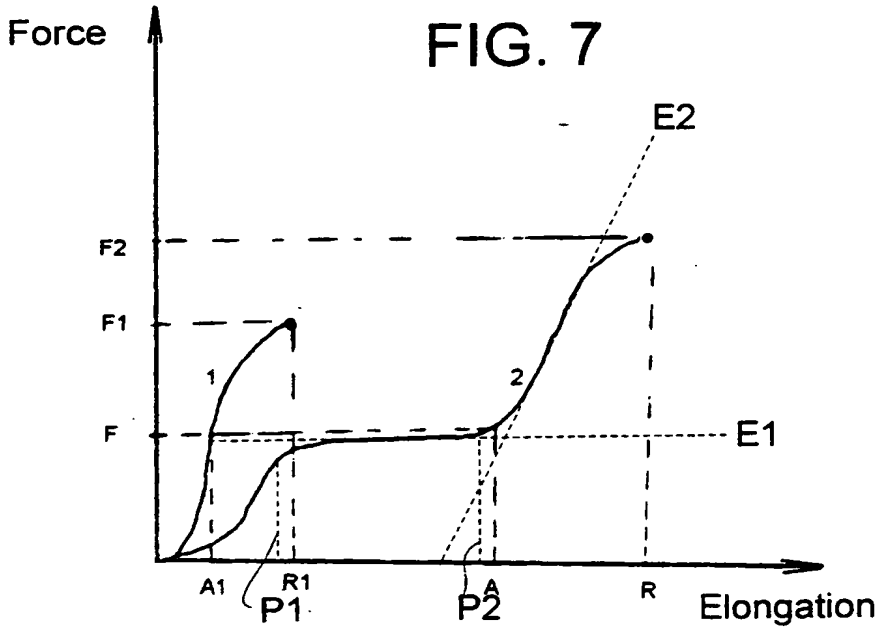


FIG. 7



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(71) Applicant *(for all designated States except US)*: **JOHNSON & JOHNSON INDÚSTRIA E COMÉRCIO LTDA.** [BR/BR]; Rua Gerivatiba, 207, CEP-05501-030 São Paulo, SP (BR).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **PASSOS PROGLHOF, Igor, Philip** [BR/BR]; Rua Euclides Miragaia, 565, ap. 13, São José dos Campos, SP (BR).

(74) Agent: **DANNEMANN, SIEMSEN, BIGLER & IPANEMA MOREIRA**; Caixa Postal 2142, Rua Marquês de Olinda, 70, CEP-22251-040 Rio de Janeiro, RJ (BR).

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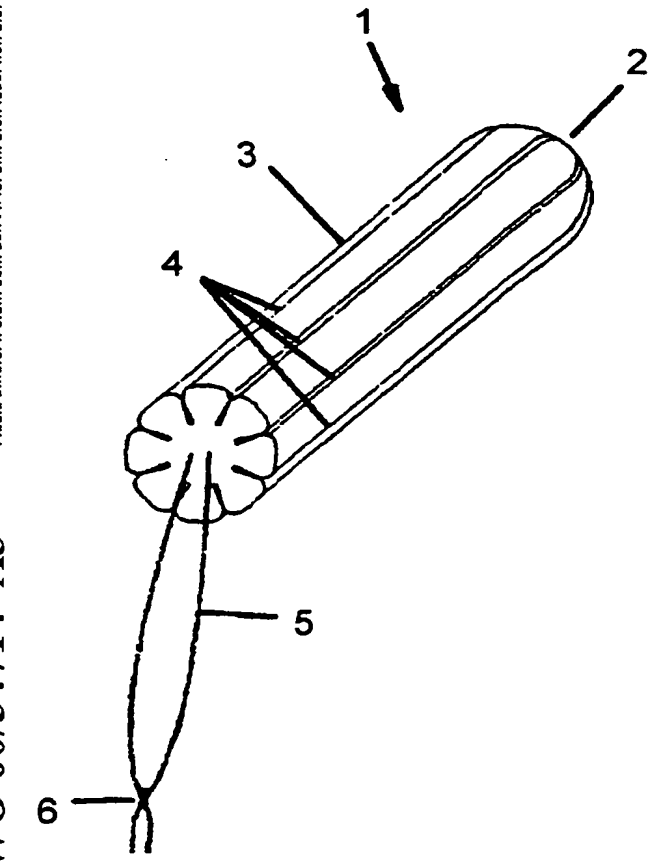
[Continued on next page]

(54) Title: TAMPON



(57) Abstract: Tampons (1) usually comprises a cord (5), which projects from one of the ends of the tampon (1) and is intended to enable one to remove said tampon (1) form the vaginal cavity right after its use. One of the objectives of the present invention is to provide a cord (5) for a tampon (1) that will no be broken or damaged at the time of compacting the absorbent body (3), replacing the cord (5) that has been used at present. This objective is achieved by means of a tampon (1), particularly a tampon for holding vaginal exudates, comprising a substantially cylindrical absorbent body (3) having longitudinal grooves (4) in its surface and comprising a cord (5) suitable for handling said tampon (1), associated to the absorbent body (3), the cord (5) being textured. A method is also described for manufacturing said tampon (1) with the respective textured cord (5).

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— *With international search report.*

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 24 23 790 A (SCHICKEDANZ VER PAPIERWERK) 20 November 1975 (1975-11-20) page 3, line 8 -page 6, line 4 page 7, line 14 -page 8, line 23; figures 1-4	1-4,9, 10, 13-17, 20-22
X	WO 99 33428 A (PLAYTEX PRODUCTS INC) 8 July 1999 (1999-07-08) abstract; claims 1-7	10-12, 14-16, 18-22

☐ Further documents are listed in the continuation of box C.

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 2423790 A	20-11-1975	NONE	
WO 9933428 A	08-07-1999	AU 1948699 A	19-07-1999